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AGRICULTURAL LANDUSE PATTERN OF NAGAON DISTRICT, ASSAM: PRESENT STATUS AND CHANGING SCENARIO

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ABSTRACT

Agricultural landuse pattern of the district is mainly influenced by the fertile plain along with favourable climatic condition of the region which permits to cultivate different varieties of crops in different season. Rice, wheat, pulses, sugarcane, spices, fruits and vegetables, different oilseeds (rape and mustard, sesame) and jute etc. are extensively cultivated all over the district. The various socio-economic factors are also responsible for producing diverse agricultural land use pattern in the district. As agriculture is considered as a primary economic activity to sustain their livelihood of rural people, therefore cultivation of different varieties of crops produce diverse landuse pattern in the district. This study is an attempt to identify the intra-district variation in agricultural cropping patter and their spatio-temporal changes over time.

Introduction

In Nagaon district of Assam, agriculture and its allied activities played an important role in the socio-economic development as this sector is considered as a major contributor towards the district economy. Agriculture is considered the backbone of rural economy of the district as it provides livelihoods of rural people.

In Assam, generally agricultural land use means the cultivation of soil for growing crops to fulfill the human needs only (Das, 1984). Agricultural land use of Nagaon district is shown by cultivation of different crops like rice, wheat, pulses, sugarcane, spices, fruits and vegetables, different oilseeds (rape and mustard, sesame) and jute etc. which are extensively cultivated all over the district. In agricultural land use pattern of Nagaon district, a significant spatio-temporal variation is observed during 2005-2017 at revenue circle level. The diverse geo-ecological set-up associated with various socio-economic factors has responsible for producing diverse agricultural land use pattern in the district (Bhagabati, 1990). It has been seen

a very slow increase in agricultural land use pattern in Nagaon district during 2005-2017. The total cropped area under all crops has increased from 315667.3 ha. in 2005-06 to 340333 ha. in 2016-17 as account for 7.81% during this period. It is noteworthy that food crops occupy an irresistible proportion of the total cropped area in the district. It is observed that food crops are occupied by 83.3% in 2005-06 as against 81.8% in 2016-17 which shows slight decreasing pattern.

Study area

Nagaon district is located in central Brahmaputra valley agro-climatic zone and it extends between 25°41′45″ North and 26°41′45″ North latitude and 92°23′45″ East and 93°20′ 00″ East longitudes.The district is comprised of 10 revenue circles viz. Kaliabor, Rupahi, Dhing, Nagaon, Samaguri, Nagaon, Raha, Kampur, Doboka, Hojai and Lanka .As the district is located Brahmaputra floodplain therefore the fertile alluvial plain has been made rich agricultural activities within the district and rice, jute, rape and mustard, sugarcane, pulses are extensively cultivated in this region. Out of the total geographical area of 397300 hectares in the district, the total cropped area occupied by 340333 hectares account for 86.66% of total area. Like other district of Assam, the traditional mode of agriculture has been carried out by the people of this region. On the basis of the growing season two types crops are practiced by the farmers which are *Kharif* crops and *rab*i crops. *Kharif* crops are cultivated in summer and harvested in winter and on the other hand rabi crops are cultivated in winter and harvested in early summer. The major cropping pattern of the district is dominated by cultivation of foodgrains crops like rice, wheat, pulses accounting for 60.84% of the total cropped area of the district during 2016-2017. Among these, rice is the stable food crop grown in region occupying 95.06% of total area of foodgrains and 57.84% of the total cropped area. The yield rate of rice has gradually increased of 24.90% during 2003-2012. This is because of the implication of new technology, HYV seeds and high rate of application of fertilizers, pesticides and insecticides on agricultural field. This study is therefore made an attempt to assess the present intra district agricultural landuse pattern at revenue circle level and highlights their changing pattern.

Objectives

The main objectives of this study are

1. to study the present intra district agricultural landuse pattern.
2. to find out the spatio-temporal variation in agricultural landuse pattern from 2005- 2017.

Methodology

The study is primarily based on secondary sources of data and the agricultural land use statistics has been collected from District Agricultural Office, Nagaon, Office of the Deputy Director of Economics & Statistics, Nagaon and Directorate of Economics and Statistics, Guwahati, Assam. Meaningful statistics and cartographic techniques and softwares like Arc GIS, MS Excel, SPSS are used to process and execute the data in the form of

maps and diagrams. Location Quotient (LQ) method has been used to represent the concentration of crops in the district.

Agricultural land use pattern: Present status and change

Agricultural landuse of Nagaon district is dominated by cultivation of rice among all other crops of the district and it covers 57.84% of total cropped area. Three varieties of rice, i.e. ahu (Autumn rice), sali and bao (winter rice) and boro (summer rice) have cultivated most of the area (Datta,1984 and Saikia, 2013). The total rice covering area of Nagaon district shows a decreasing trend and it decrease 212280 ha. to 196850 ha. during 2005-2017. The rice covering area shows increase in Rupahi revenue circle (62.33%) and Samaguri revenue circle (44.52%) during 2005-2017 and Doboka, Hojai, Dhing and Sadar revenue circle Shows decreasing pattern of rice covering area**.** It is worth mentioning that among the rice varieties, summer rice (*boro*) cultivation covering area increase tremendously 4.6% to 12.25% during 2005- 2017 compared to other types of rice. Concentration of Summer rice (*boro*) cultivation is high in Samaguri, Rupahi, Dhing and Kampur revenue circle in Nagaon district. Summer rice cultivation is mainly influenced among the farmers of chronically flood affected areas where autumn rice gets much affected by floods (Bhagabati and Dutta, 2001).

Table: 1: Rice distribution in Nagaon district, 2005- 2017

Name of revenue circle	Total area of rice (area in ha.)			
	2005-2006	2012-2013	2016-2017	Change (%) from 2005-2017
Kaliabor	13649	17528	14109	3.37
Sadar	23871	24744	10367	-56.57
Dhing	24761	18445	22446	-9.35
Raha	20864	6600	21413	2.63
Rupahi	15418	17256	25029	62.33
Kampur	23395	13953	27857	19.07
Samaguri	19969	30524	28859	44.52
Lanka	24098	26159	29767	23.52
Doboka	21289	7253	12305	-42.2
Hojai	24966	15891	4698	-81.18
Nagaon district	**212280**	**178355**	**196850**	**-7.26**

Source: Directorate of Economics and Statistics, Assam, 2016-2017

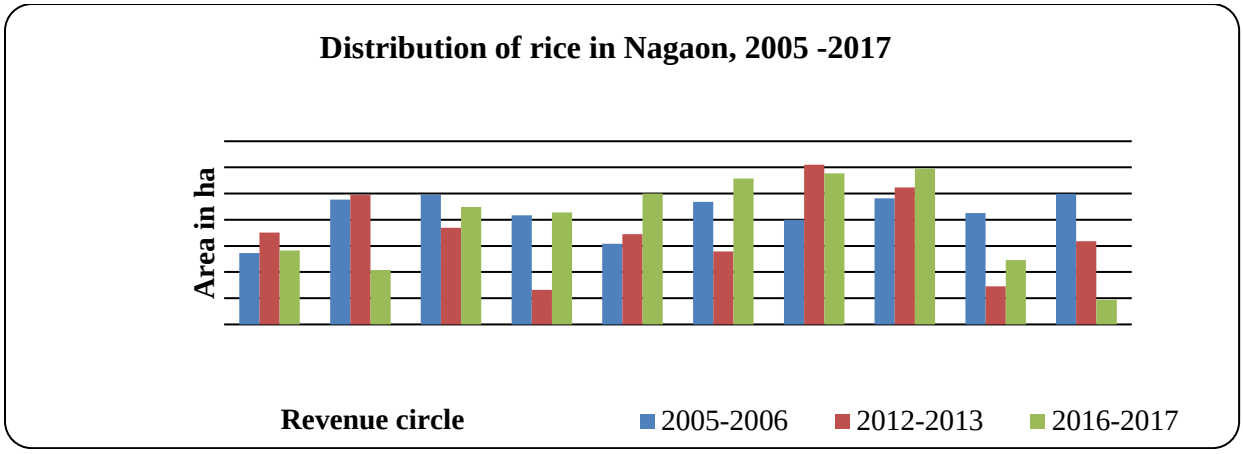


Fig. 1

Wheat is another food crops which covers very small portion accounting for 0.3% of total cropped area in the district during 2016-17. Wheat covering areas in the district are showing decreasing trend which marked as -65.3% during 2005-2017. It is seen that wheat distribution increased in Dhing and Kampur Revenue circle and other revenue circle of the district shows decreasing trend within 2005-2017**.**

Pulses are one of the important food crops covering 2% of total cropped area of Nagaon district in 2016-17. Among the pulses gram, tur (arahar) and rabi pulses such as lentil (masur), blackgram (matikalai), green gram (moong), pea (motor) etc are cultivated in the district (Das, 1984, Bhagabati and Dutta, 2001). Pulses covering areas are increase in Kampur revenue circle (130.08%), followed by Raha revenue circle (36.19%). Except these two revenue circle, pulses distribution shows in decreasing trend in other revenue circle of the district .

Sugarcane considered as one of the important cash crop in the district and it is grown more or less evenly within the district. Sugarcane occupies 1.6% of total cropped area in the district during 2005-06 and it increases up to 2.14% in 2016-17. So far concentration of sugarcane during 2005-2017 is concerned at revenue circle level, it is not even within the district. However, sugarcane is significantly concentrated and showing in a increasing trend in the revenue circle of Dhing, Kaliabor, Kampur, Hojai and Samaguri .

Jute is another important cash crop and it is cultivated within the district in varying pattern. Jute concentration represents 3.17% of total cropped area in the district during 2016-17. It is observed that there had been a significant fluctuation in jute covering area during 2005-2017and it represents -27.1% area decreases within this period. Jute concentration is high in the revenue circle of Dhing, Samaguri Rupahi and Kampur. Besides jute, cotton and mesta another fiber crops are grown in a small portion in the district.

Rape and mustard is considered as dominant crops among the oilseed grown in the district and it occupies 77.8% of total oilseeds area in the district. Besides rape and mustard, sesame, linseed, coconut, ground nut, sunflower and nizer are grown more or less evenly within the district. Rape and mustard represents 4.74% of total cropped area and considered as the third highest occupying crops in respect of area in hectare among all crops in the district during 2016-17. It is observed that rape and mustard covering area

is increased at a rate of 13.1% during the period of 2005-2017. Rape and mustard growing area are tremendously increase in the revenue circle like Kampur, Samaguri, Kaliabor, Doboka and Raha.

Various types of spices are grown in the district and it occupies 2.9% of total cropped area. The important spices are grown in the district include chilies, ginger, garlic, turmeric, black peeper, cardamom and coriander. The significant spices cultivation is mainly concentrated in Sadar, Hojai, Samaguri and Lanka revenue circle of the district. It is observed that spices cultivation is growing significantly in an increasing trend in the district.

Fruits and vegetables are occupying a significant portion in agricultural land use pattern in Nagaon district. Several varieties of fruits are grown in the district and of these, banana, papaya, pineapple, orange and pome fruits are common and variety of vegetables include potato, sweet potato, onion, cabbage, cauliflower, sponge gourd, brinjal, pumpkin, tomato etc. are extensively grown in the district. Fruits and vegetables cover 31307 ha. Which account for 9.2% of total cropped area and represents second highest concentration of crops in the district during 2016-17. It has been seen that fruits and vegetables cultivation in the district are growing in an increasing trend at a rate of 45.7% during 2005- 2017. Fruits and vegetable mainly concentrated in Sadar, Dhing Lanka and Doboka revenue circle in the district.

Concentration of major crops

Crop Concentration implies the deviation in the proportion of any crop in a spatial unit of a region at a given point of time. Delineation of crop concentration region helps in determining the areas where a particular crop grows well even with the help of minimum inputs and thus has great impact on agricultural development and planning (Kalita, 2013). Geographers have been used several techniques to delineate the crop concentration regions in India and it involves to measure the ratio between two units of measurement in the same area (Bhatia, 1965). In 1965 Bhatia has been used Location Quotient method for delineating the regional concentration of crops in India.

This Location Quotient method (LQ) has been used to delineate the crop concentration region in Nagaon district and it may be expressed as

$$\text{L.Q} = \frac{area\ of\ crop\ X\ in\ the\ revenue\ circle}{area\ of\ all\ crops\ in\ the\ revenue\ circle} \div \frac{area\ of\ crop\ X\ in\ the\ district}{area\ of\ all\ crops\ in\ the\ district}$$

In Nagaon district, concentration of eight major crops at revenue circle level can be measured with the help of Location Quotient method for the year 2012-13 and 2016-17. There has been a fluctuating trend in concentration of all crops at revenue level within the district. It has been observed that Rice is highly concentrated in Sadar, Rupahi, Samaguri, Kampur, Hojai and Lanka revenue circles in 2012-13 but in 2016-17 Sadar and Hojai revenue circle shows decreasing trend in rice concentration against Dhing and Raha revenue circle which falls in high concentration area in rice. Wheat is highly concentrated in Dhing, Kampur and Samaguri revenue circle. Pulses are mostly concentrated in Kaliabor, Dhing Rupahi, Doboka and Hojai. Sugarcane concentration is highly found in Kaliabor, Sadar, Dhing, Kampur, Lanka and Hojai. Spices are predominantly concentrated in Sadar, Raha, Samaguri and Hojai. Fruits and vegetables are mainly concentrated in Sadar,

Dhing, Rupahi, Samaguri, Doboka and Hojai. Rape and Mustard is highly concentrated in Kaliabor, Sadar, Samaguri and Hojai. Jute concentration is very high in Rupahi, Kampur, Samaguri and its concentration very low in Raha, Lanka and Doboka.

Table 2: Crop Concentration of Nagaon district 2012 - 2017

Name of Revenue Circle	Year	Location quotient index							
		Rice	Wheat	Pulses	Sugarcane	Spices	Fruits and Vegetable	Rape and Mustard	Jute
Kaliabor	2012-13	0.54	0.26	0.39	0.51	0.62	0.73	1.14	0.40
	2016-17	0.66	0.04	1.32	1.47	0.91	0.92	1.47	0.80
Sadar	2012-13	1.16	1.16	0.65	0.69	1.38	1.03	1.58	0.34
	2016-17	0.74	0.67	0.86	1.13	1.69	1.81	2.20	0.77
Dhing	2012-13	0.95	0.37	1.52	0.67	0.62	0.99	2.77	2.86
	2016-17	1.06	2.46	1.25	1.44	0.69	1.15	0.70	2.20
Raha	2012-13	0.90	1.39	1.15	2.80	2.07	2.07	0.70	0.25
	2016-17	1.13	0.15	0.88	0.49	1.01	0.83	0.67	0.37
Rupahi	2012-13	1.18	3.54	0.69	0.90	0.89	0.93	0.49	2.14
	2016-17	1.15	0.79	1.04	0.02	0.72	1.02	0.69	1.26
Kampur	2012-13	1.16	1.31	0.46	2.03	1.16	1.52	0.46	0.42
	2016-17	1.18	2.11	0.72	1.86	0.66	0.85	0.78	1.07
Samaguri	2012-13	1.15	0.78	0.20	0.51	1.15	0.83	1.13	1.46
	2016-17	1.10	1.49	0.77	0.13	1.37	1.00	1.54	1.59
Lanka	2012-13	1.18	0.30	3.21	1.46	0.74	0.48	0.10	0.04
	2016-17	1.21	0.07	0.69	1.11	0.92	0.45	0.37	0.27
Doboka	2012-13	0.79	0.69	0.63	1.44	1.39	2.17	0.26	0.11
	2016-17	0.84	0.00	1.60	0.22	0.91	1.29	0.71	0.31
Hojai	2012-13	1.17	1.15	1.13	1.30	1.05	0.98	0.16	1.77
	2016-17	0.45	2.70	1.37	3.03	1.63	1.27	1.34	0.93

Source: Calculated by the researcher

Fig: 2

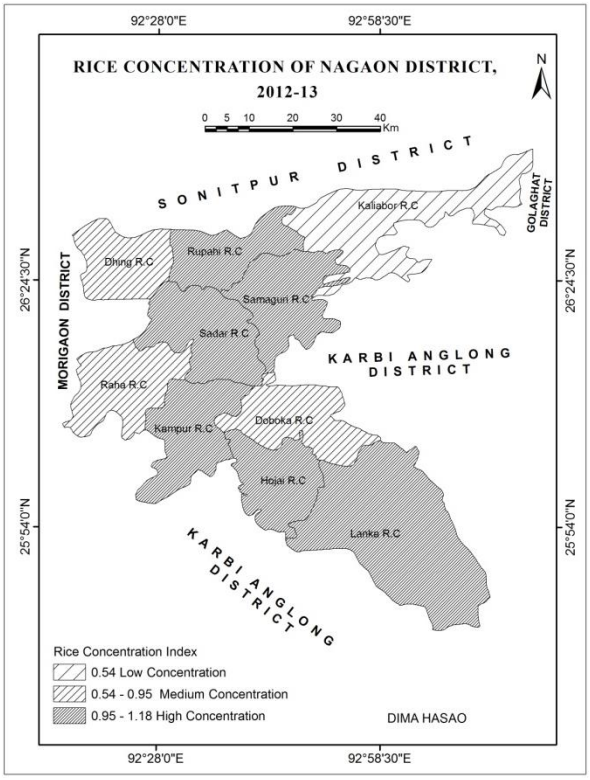
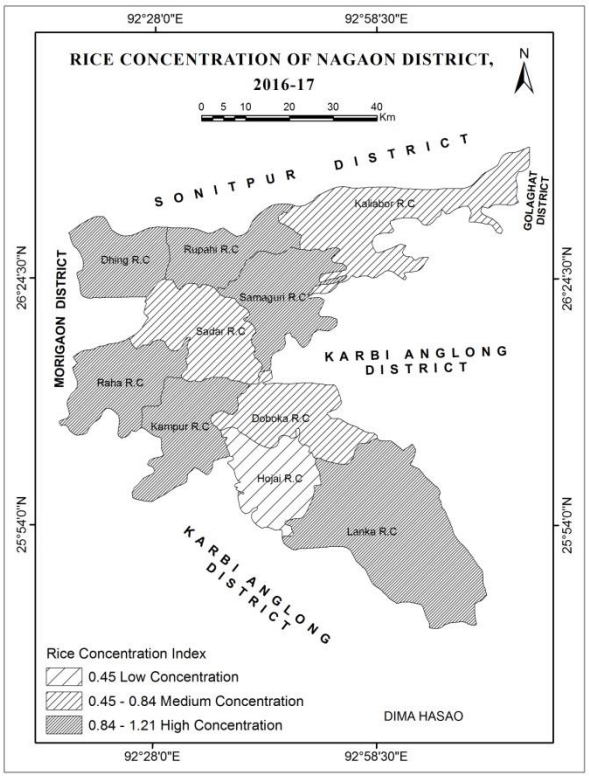


Fig:3



Modernization in agriculture

Modernization in agriculture implies the cultural enhancement of a region. It involves in use of modern technique in agricultural activities to increase the productivity of per unit of area. It is a process of transforming the agricultural activities from traditional-labour based agriculture to technology based agriculture (Kusz, 2014). Modernization in agriculture in Nagaon district is governed by number of factors like adoption of HYV seeds, implementation of irrigation facilities, use of fertilizers, application of pesticides and insecticides and use of modern tools and farm implements etc (Deka, 2013). The modernization in agricultural process leads a considerable change in cropping pattern and cropping intensity to produce high agricultural outputs which reflects the spatio-temporal variation in agricultural landuse pattern in Nagaon district.

Conclusion

The cropping pattern of the district although modernized to a certain extent but is still influenced by traditional mode of practices. As the farming community of the district is very poor and marginal, therefore they have to involve in cultivate crops to sustain their livelihoods only. As food crops occupies major portion of the district, rice is extensively cultivated among all other crops which provide food for the people and fodder for the livestocks.

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